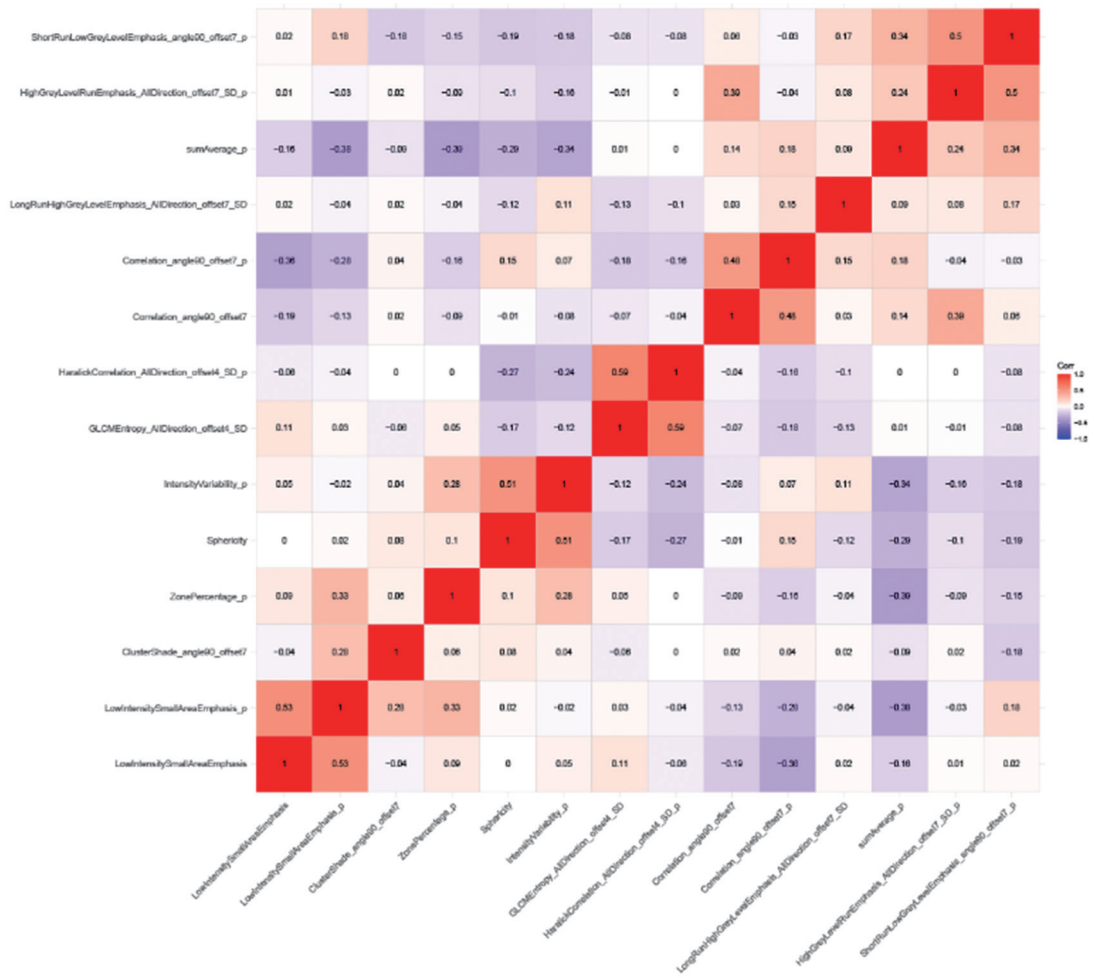
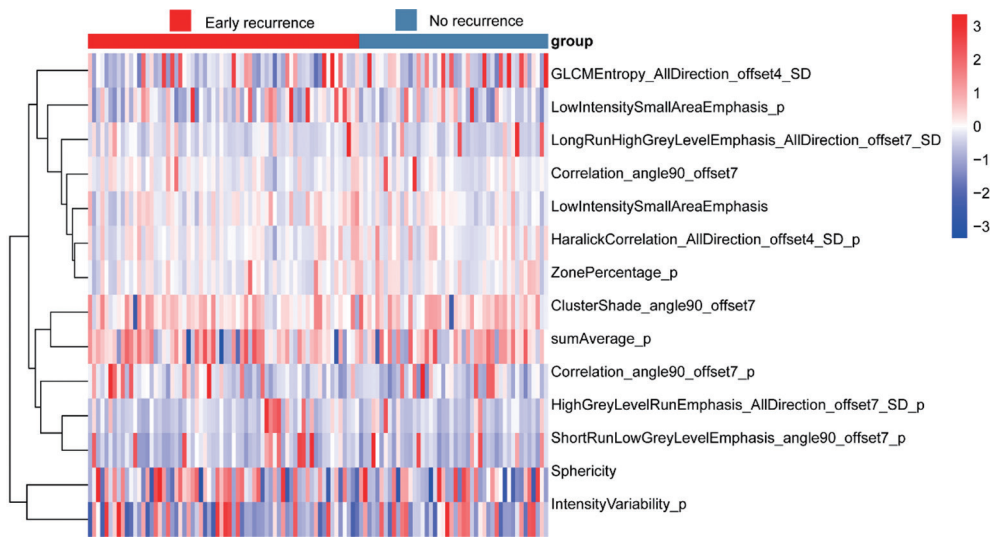


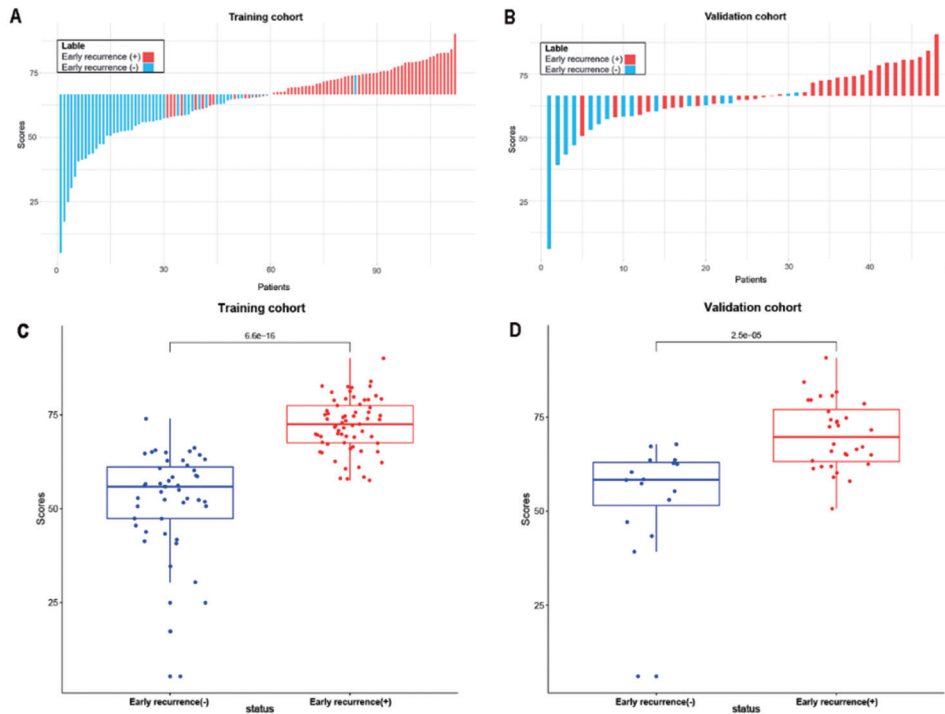
**Figure S1** Feature selection and presentation. The final radiomics and corresponding coefficients of different models were obtained by screening through LASSO regression analysis. A: OROI, B: ROI 1, C: ROI 2, D: ROI 3, E: ROI 4, F: ROI 5. LASSO, least absolute shrinkage and selection operator; OROI, original region of interest; ROI, regions of interest.



**Figure S2** Radiomics heatmaps. Heatmap depicts correlation coefficients matrix of 14 selected features in the ROI 3 radiomics. ROI, region of interest.



**Figure S3** Heatmap depicting the 14 features in the ROI 3 radiomics model in the ER-positive and ER-negative groups in the training cohort. ROI, region of interest; ER, Early recurrence.



**Figure S4** High and low risk subgroup analysis. The optimal cutoff value is 66.5 based on the combined model, total prediction scores for each patient in the training (A) and validation cohort (B). Box plot comparison of the total scores of patients in the early recurrence positive and early recurrence negative groups in the training (C) and validation cohort (D).

**Table S1** Technical details of CT examination protocols

CT scanner	Tube voltage (kVp)	Tube current	Tube current (mAs)	Rotation time (s)	Beam collimation (mm)	Matrix	Slice thickness (mm)	Field of view (mm × mm)
Philips Brilliance 64	120	240 mAs	240	0.5	64×0.625	512×512	5	350×350
GE Revolution	120	135–240 mAs with automated modulation	135–240	0.5	80×0.625	512×512	5	330×330

CT, computed tomography.

**Table S2** Number of extracted 6 types of radiomic features

Feature categories	Number
Histogram	42
Grey Level Cooccurrence Matrix (GLCM)	144
Grey Level Run Length Matrix (GLRLM)	180
Grey Level Size Zone Matrix (GLSZM)	11
Form factor	9
Haralick	10

**Table S3** Features selected from different regions of interest

ROI	Number of features	Features
OROI	3	High Grey Level Run Emphasis_All Direction_offset7_SD, High Grey Level Run Emphasis_angle90_offset7_p, Intensity Variability_p
ROI 1	6	Inverse Difference Moment_All Direction_offset7_SD_p, High Grey Level Run Emphasis_All Direction_offset7_SD, Gray level co-occurrence matrix Energy_All Direction_offset4_SD_p, Intensity Variability _p, Sum Entropy, Kurtosis
ROI 2	11	Short Run High Grey Level Emphasis_All Direction_offset7_SD, High Grey Level Run Emphasis_All Direction_offset7_SD, High Grey Level Run Emphasis_angle90_offset7_p, Haralick Correlation_AllDirection_offset7_SD, Cluster Shade_AllDirection_offset1_SD, Gray level co-occurrence matrix Energy_AllDirection_offset4_SD_p, Correlation_angle90_offset7, Inverse Difference Moment, Intensity Variability _p, Skewness_p, Kurtosis
ROI 3	14	Long Run High Grey Level Emphasis_AllDirection_offset7_SD, High Grey Level Run Emphasis_AllDirection_offset7_SD_p, Short Run Low Grey Level Emphasis_angle90_offset7_p, Haralick Correlation_AllDirection_offset4_SD_p, Gray level co-occurrence matrix Entropy_AllDirection_offset4_SD, Correlation_angle90_offset7, Cluster Shade_angle90_offset7, Low Intensity Small Area Emphasis, Low Intensity Small Area Emphasis _p, Correlation_angle90_offset7_p, Intensity Variability _p, Zone Percentage_p, Sum Average _p, Sphericity
ROI 4	2	Intensity Variability _p, Kurtosis
ROI 5	12	Long Run High Grey Level Emphasis_AllDirection_offset7_SD_p, Haralick Correlation_All Direction_offset4_SD_p, Short Run Emphasis_All Direction_offset1_SD_p, Gray level co-occurrence matrix Entropy_All Direction_offset4_SD, Cluster Shade_angle90_offset7, Correlation_angle90_offset7, Correlation_angle90_offset7_p, Low Intensity Large Area Emphasis, Low Intensity Small Area Emphasis _p, Small Area Emphasis, Intensity Variability _p, Sum Average _p

OROI, original region of interest; ROI, region of interest.

The predictive value of the radiomics model was calculated using the following formula

$$\begin{aligned}
 \text{Rad score} = & -0.166 + (-0.180 \times \text{Cluster Shade\_angle90\_offset7}) + \\
 & (0.056 \times \text{Correlation\_angle90\_offset7}) + \\
 & (-0.058 \times \text{Grey level co-occurrence matrix Entropy\_AllDirection\_offset4\_SD}) + \\
 & (-0.148 \times \text{Long Run High Grey Level Emphasis\_AllDirection\_offset7\_SD}) + (0.035 \times \text{Sphericity}) + \\
 & (-0.043 \times \text{Low Intensity Small Area Emphasis}) + \\
 & (0.137 \times \text{Correlation\_angle90\_offset7\_p}) + \\
 & (-0.903 \times \text{Haralick Correlation\_All Direction\_offset4\_SD\_p}) + \\
 & (-0.066 \times \text{Sum Average\_p}) + \\
 & (-0.088 \times \text{High Grey Level Run Emphasis\_All Direction\_offset7\_SD\_p}) + \\
 & (-0.053 \times \text{Short Run Low Grey Level Emphasis\_angle90\_offset7\_p}) + \\
 & (0.168 \times \text{IntensityVariability\_p}) + \\
 & (-0.122 \times \text{Low Intensity Small Area Emphasis\_p}) + \\
 & (-1.538 \times \text{Zone Percentage\_p})
 \end{aligned}$$

**Table S4** The IDI and continuous-NRI

Models	IDI		Continuous-NRI	
	95% CI	P value	95% CI	P value
Training cohort				
Clinical model				
Radiomics model	0.25 (0.11–0.38)	<0.001	0.62 (0.27–0.98)	<0.001
Combined model	0.45 (0.36–0.55)	<0.001	1.32 (1.04–1.60)	<0.001
Validation cohort				
Clinical model				
Radiomics model	0.18 (0.01–0.35)	0.03	0.63 (0.06–1.19)	0.03
Combined model	0.25 (0.12–0.39)	<0.001	1.06 (0.57–1.56)	<0.001

IDI, integrated discrimination improvement; NRI, net reclassification improvement; CI, confidence intervals.

**Table S5** The incidences of early recurrence of hepatocellular carcinoma in the low- and high-risk groups

Cohorts	ER	Without ER	P value
Training cohort			
High- risk group	52 (80.0%)	1 (2.1%)	<0.001
Low- risk group	13 (20.0%)	46 (97.9%)	
Validation cohort			
High- risk group	18 (58.1%)	2 (12.5%)	<0.001
Low- risk group	13 (41.9%)	14 (87.5%)	

ER, early recurrence.